

OCEAN SCIENCE

Effects of Rising Ocean Acidification on Fisheries in Spotlight

A reef fish that can't find its way home and whose erratic behaviour constantly puts it in danger might make a nice premise for a children's movie, but oceans filled with Dory's could spell disaster for their survival.

Higher atmospheric carbon dioxide levels means more is being absorbed in seawater, with some young fish's nervous systems being affected.

Not with standing the wonderful diversity of marine wildlife around our shores, with 130 species commercially fished in New Zealand and worth \$1.2 billion annually, finding out what's in store for them in a warming world is important.

If snapper and others start showing Dory traits fishery's could be affected.

With a budget of nearly \$5 million over 4 years researchers at Niwa, Cawthron Institute in Nelson, University of Auckland, and Otago University under the Carim (Coastal Acidification: Rate, Impact and Management) programme will be looking at affects on phytoplankton, aquaculture species paua and greenshell mussels, and young snapper.

They'll also incorporate data from long term monitoring already going on at 14 diverse sites around the coastline—part of the New Zealand Ocean Acidification Observing Network (NZOA-ON) to develop models, and hopefully come up with some solutions.

How rising ocean acidification might effect fish

wasn't really considered until five years ago, says programme leader Dr Cliff Law - ocean biogeochemistry expert at the National Institute of Water and Atmospheric Research(NIWA).

But research on Australian reef fish showed the larvae of some fish species are affected by low pH. They can lose their sense of direction, be more reckless and lose their sense of risk aversion around predators, programme leader and ocean biogeochemistry expert at the NIWA Dr Cliff Law says.

While the impacts of acidification on shellfish have become much clearer, this came out of the blue," he says.

Various species globally are now being studied, including kingfish larvae at Bream Bay which appear unaffected.

Larval shellfish face difficulties growing their shells, and new research shows mussels may also have problems attaching to rocks.

After oyster hatcheries started failing on the Oregon shoreline on the United States west coast 15 years ago, low pH in ocean waters was found to be the culprit.

Cyclic upwelling was bringing nutrients from deep in the ocean to the coast upsetting pH levels in the water. This water was then being pumped into the hatcheries and killing the young shellfish.

Many hatcheries have moved to Hawaii, away from the upwelling. The ones remaining have learnt how to mitigate the worst of the effects and remain viable.

"It would be irresponsible to say New Zealand and shellfish farming won't be affected by climate change," says green mussel expert Norman Ragg with Cawthron Institute in Nelson, "but we are in a strong position."

The experience of the US farmers gives us an extraordinary opportunity to learn and tweak our own commercial operations well ahead of time, he says.

Keeping larvae longer before establishing them in seawater farms, altering the pH of sea water used in the hatchery, and finding and breeding from families of shellfish more resistant to low pH are just some of the options.

Source: Stuff.co.nz
<http://www.stuff.co.nz/business/farming/aquaculture/83102158/effects-of-rising-ocean-acidification-on-fisheries-in-spotlight>

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ORGANIZATIONAL PROFILE

A GIFT for the Caribbean

The Gender in Fisheries Team (GIFT) is a network of people interested in gender in Caribbean small-scale fisheries (www.cavehill.uwi.edu/cermes/projects/gift/overview.aspx). It comprises fisherfolk organization leaders, scientists, NGO staff, inter-governmental organization officers and others. GIFT was formed in January 2016 by the staff of the Centre for Resource Management and Environmental Studies (CERMES) of the regional University of the West Indies (UWI) who were seeking partnerships in applied gender research in fisheries.

Gender has not been high priority in Caribbean fisheries policy, planning or management. Compared to fisheries in other regions, the gender characteristics of the Caribbean are poorly documented. CERMES and partners are conducting applied interdisciplinary research and outreach to

better understand gender, and to inform policy and practice concerning small-scale fisheries. The local knowledge of fisherfolk is an important part of the information gathering.

The main objective of GIFT is to facilitate and

G I F T

support implementation of the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) in the Caribbean Regional Fisheries Mechanism (CRFM) member states. Within the SSF Guidelines, its focus is on the section on gender equality. The CRFM covers 17 small island developing states that also constitute the geographic scope of the Caribbean Network of Fisherfolk Organizations (CNFO).

Initially, GIFT will focus on SSF fisheries value chains and governance arrangements at sub-regional, national and local levels. The approach to gender is concentrating on livelihoods and governance institutions, taking an ecosystem approach to fisheries. Topics such as climate and disasters, along with poverty, food security and other aspects of the SSF Guidelines, are part of the GIFT mandate. Current activities include scoping for secondary data on these topics.

GIFT was represented at the 6th Global Symposium on Gender in Aquaculture and Fisheries (GAF6), held in Bangkok, Thailand, from 3-7 August 2016, and shared findings from a small survey on fisherfolk leaders' perspectives on the gender content of the SSF Guidelines. It found that while fisherfolk leaders admitted to gender inequalities, they said that fisheries were closer to achieving gender equality than the societies in which they were situated. GIFT also provided a regional overview of aspects of gender, based on the secondary data collected.

VERBATIM

Most fish stocks have traditionally been common property which anyone has been free to exploit. In such a situation, no one has a clear incentive to keep the harvest within sustainable limits; a fish spared today is likely to be somebody else's catch tomorrow.

— ROGNVALDUR HANNESSON OF THE NORWEGIAN SCHOOL OF ECONOMICS AND BUSINESS ADMINISTRATION

FISHERIES OVERVIEW

Food Security and Nutrition

Faced with one of the world's greatest challenges—how to feed more than 9 bn people by 2050 in a context of climate changes, economic and financial uncertainty, and growing competition for natural resources—the international community made unprecedented commitments in September 2015 when UN Member States adopted the 2030 Agenda for Sustainable Development. The 2030 Agenda also sets aims for the contribution and conduct of fisheries and aquaculture towards food security and nutrition in the use of natural resources so as to ensure sustainable development in economic, social and environmental terms.

Many millennia after terrestrial food production shifted from hunter-gatherer activities to agriculture, aquatic food production has transitioned from being primarily based on capture of wild fish to culture of increasing numbers of farmed species. A milestone was reached in 2014 when the aquaculture sector's contribution to the supply of fish for human consumption overtook that of wild-caught fish for the first time. Meeting the ever-growing demand for fish as food in conformity with the 2030 Agenda will be imperative, and also immensely challenging.

With capture fishery production relatively static since the late 1980s, aquaculture has been responsible for the impressive growth in the supply of fish for human consumption. Whereas aquaculture provided only 7 per cent of fish for human consumption in 1974, this share had increased to 26 per cent in 1994 and 39 per cent in 2004. China has played a major role in this growth as it represents more than 60 per cent of world aquaculture production.

Growth in the global supply of fish for human consumption has outpaced population growth in the past five decades,

increasing at an average annual rate of 3.2 per cent in the period 1961–2013, double that of population growth, resulting in increasing average per capita availability. World per capita apparent fish consumption increased from an average of 9.9 kg in the 1960s to 14.4 kg in the 1990s and 19.7 kg in 2013, with preliminary estimates for 2014 and 2015 pointing towards



further growth beyond 20 kg. In addition to the increase in production, other factors that have contributed to rising consumption include reductions in wastage, better utilization, improved distribution channels, and growing demand linked to population growth, rising incomes and urbanization. International trade has also played an important role in providing wider choices to consumers.

Although annual per capita consumption of fish has grown steadily in developing regions (from 5.2 kg in 1961 to 18.8 kg in 2013) and in low-income food-deficit countries (LIFDCs) (from 3.5 to 7.6 kg), it is still considerably lower than that in more developed regions, even though the gap is narrowing. In 2013, per capita apparent fish consumption in industrialized countries was 26.8 kg. A sizeable and growing share of fish consumed in

developed countries consists of imports, owing to steady demand and static or declining domestic fishery production. In developing countries, where fish consumption tends to be based on locally available products, consumption is driven more by supply than demand. However, fuelled by rising domestic income, consumers in emerging economies are experiencing a diversification of the types of available fish through an increase in fishery imports.

Global total capture fishery production in 2014 were 93.4 mn tonnes, of which 81.5 mn tonnes were from marine waters and 11.9 mn tonnes from inland waters. For marine fisheries production, China remained the major producer followed by Indonesia, the United States of America and the Russian Federation. Catches of anchoveta in Peru fell to 2.3 mn tonnes in 2014—half that of the previous year and the lowest level since the strong El Niño in 1998—but in 2015 they had already recovered to more than 3.6 mn tonnes. For the first time since 1998, anchoveta was not the top-ranked species in terms of catch as it fell below Alaska pollock.

World catches in inland waters were about 11.9 mn tonnes in 2014, continuing a positive trend that has resulted in a 37 per cent increase in the last decade. Sixteen countries have annual inland water catches exceeding 200,000 tonnes, and together they represent 80 per cent of the world total.

Production of aquatic animals from aquaculture in 2014 amounted to 73.8 mn tonnes, with an estimated first-sale value of US\$160.2 bn. This total comprised 49.8 mn tonnes of finfish (US\$99.2 bn), 16.1 mn tonnes of molluscs (US\$19 bn), 6.9 mn tonnes of crustaceans (US\$36.2 bn) and 7.3 mn tonnes of other aquatic animals including amphibians (US\$3.7 bn). China accounted

for 45.5 mn tonnes in 2014, or more than 60 per cent of global fish production from aquaculture. Other major producers were India, Vietnam, Bangladesh and Egypt. In addition, 27.3 mn tonnes of aquatic plants (US\$5.6 bn) were cultured.

An estimated 56.6 mn people were engaged in the primary sector of capture fisheries and aquaculture in 2014, of whom 36 per cent were engaged full time, 23 per cent part time, and the remainder were either occasional fishers or of unspecified status. Following a long upward trend, numbers have remained relatively stable since 2010, while the proportion of these workers engaged in aquaculture increased from 17 per cent in 1990 to 33 per cent in 2014. In 2014, 84 per cent of the global population engaged in the fisheries and aquaculture sector was in Asia, followed by Africa (10 per cent), and Latin America and the Caribbean (4 per cent).

Of the 18 mn people engaged in fish farming, 94 per cent were in Asia. Women accounted for 19 per cent of all people directly engaged in the primary sector in 2014, but when the secondary sector (for example, processing, trading) is included women make up about half of the workforce. The total number of fishing vessels in the world in 2014 is estimated at about 4.6 mn, very close to the figure for 2012. The fleet in Asia was the largest, consisting of 3.5 mn vessels and accounting for 75 per cent of the global fleet, followed by Africa (15 per cent), Latin America and the Caribbean (6 per cent), North America (2 per cent) and Europe (2 per cent).

Globally, 64 per cent of reported fishing vessels were engine-powered in 2014, of which 80 per cent were in Asia, with the remaining regions all under 10 per cent each.

—from *The State of World Fisheries and Aquaculture*, 2016. FAO.

<http://www.fao.org/3/a-i5555e.pdf>

INFOLOG: NEW RESOURCES AT ICSF

ICSF's Documentation Centre (dc.icsf.net) has a range of information resources that are regularly updated. A selection:

Publications

FAO. 2016. *Climate change implications for fisheries and aquaculture: Summary of the findings of the Intergovernmental Panel on Climate Change Fifth Assessment Report*, by Anika Seggel and Cassandra De Young. *FAO Fisheries and Aquaculture Circular No. 1122*. Rome, Italy.

This report aims to facilitate the use of the Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5) by those concerned with the fisheries and aquaculture sector and their dependent communities. The extensive information within the AR5 is condensed from the fisheries and aquaculture perspective, and guiding links to the relevant IPCC documents facilitating further investigation are provided.

FAO. 2016. *Fisheries in the drylands of sub-Saharan Africa—"Fish come with the rains". Building resilience for fisheries-dependent livelihoods to enhance food security and nutrition in the drylands*, by Jeppe Kolding, Paul van Zwieten, Felix Marttin and Florence Poulain. *FAO Fisheries and Aquaculture Circular No. 1118*. Rome, Italy.

The focus of this review is to both document the general resilience of many fish resources to climatic variability—including their underestimation in livelihood importance, particularly in protracted crisis situations—and to enhance the potential supply of fish from dryland areas through improved use of the available water bodies, and in particular small reservoirs. The important role that small water bodies play in supplying essential micronutrients and protein to rural communities has largely been overlooked since the termination of the FAO/ALCOM (Aquaculture for Local Community Development) programme in 1998, although they are more productive on a per unit area basis than the large lakes and reservoirs and, when pooled, constitute a much larger area of water.

Taylor, W. W., D. M. Bartley, C. I. Goddard, N. J. Leonard, and R. Welcomme, editors. 2016. *Freshwater, fish and the future: proceedings of the global cross-sectoral conference. Food and Agriculture Organization of the United Nations, Rome; Michigan State University, East Lansing; American Fisheries Society, Bethesda, Maryland*

<http://www.fao.org/3/a-i5711e.pdf>

The purpose of this book, and the global conference (www.inlandfisheries.org), is to elevate the significance of freshwater fisheries throughout the world so that fishery managers and the people that depend on freshwater fisheries will have a voice when policymakers make decisions that impact their viability and productivity.

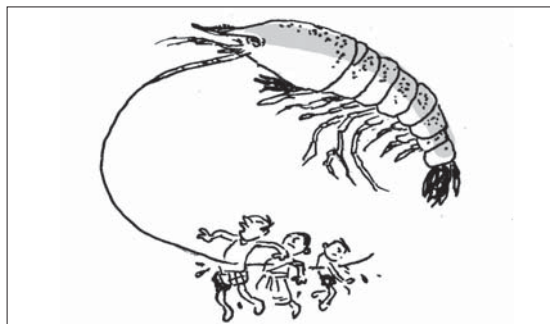
Videos

Implementation of the SSF Guidelines
New Delhi workshop, Videos of presentations/discussions
<https://www.youtube.com/watch?v=8BtS76s5rvQ&app=desktop>
<https://www.youtube.com/watch?v=tnMBWxIDS9Q&feature=youtu.be>
Pesca Vital: Diretrizes Internacionais para a Valorização da Pesca Artesanal

FLASHBACK

Time to shift gear

Only three per cent of global aquaculture production comes from the *Penaeus* species—the backbone of the shrimp aquaculture industry. Yet, culturing these species has posed some of the greatest threats to the coastal communities in Asia and Latin America, so much so that it has been nicknamed the 'rape and run' industry. Fishing communities, in particular, have been very concerned with its negative impacts. These include the destruction of fish larvae and removal of gravid females, the obstruction of fishing operations by coastal installations, and the fishermen's loss of access to the fishing ground from the landward side.



For the coastal communities, there are additional problems like the depletion and contamination of ground water, loss of access to the village commons, and incursion of salinity into the paddy fields. Further, the loss of mangrove cover has several particularly negative implications. These problems were making life almost impossible for the coastal communities in countries like India, Bangladesh, Ecuador and Thailand, especially in the past five to 10 years. The severity of these problems has been compounded by the lack of proper legal and management regimes, and the existence of rampant corruption in administration.

In this context, the judgement delivered by the Supreme Court of India—the highest court of the country—striking down all brackish water operations within 500 m of the high tide line is quite a significant landmark, as pointed out by several articles in this issue of SAMUDRA. The judgement is, perhaps, the one with the greatest impact on the shrimp aquaculture industry anywhere in the world.

We hope the Indian Supreme Court judgement will mark the beginning of a defining shift from feed-intensive, carnivorous, monoculture systems of aquaculture that are clearly unsustainable, to the freshwater polyculture systems for herbivorous and omnivorous species, dependent on locally available nutrient inputs.

— from Comment in SAMUDRA Report No. 17, March 1997

ANNOUNCEMENTS

MEETINGS

Second Session of the Preparatory Committee established by the UN General Assembly resolution 69/292:
 Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction 26 August to 9 September 2016, New York (2 weeks)

IUCN World Conservation Congress
 1 - 10 September 2016, Hawaii

Decent Work for Blue Growth: Towards Social Responsibility in the Fish Business The Vigo Dialogue on decent employment in fisheries and aquaculture which will be held again in Vigo on 4 October 2016, on the occasion of the Conxemar International Frozen Seafood Exhibition and the World Congress on Cephalopods, Vigo, 3 - 6 October 2016

13th meeting of the Conference of the Parties to the Convention on Biological Diversity

4 - 17 December 2016, Cancun, Mexico

WEBSITES

The Asia Floor Wage Alliance is a global coalition of trade unions, workers rights and human rights organizations
<http://asia.floorwage.org/>

Rome Declaration launches international cross-sectoral effort for responsible inland fisheries
<http://inlandfisheries.org/>

Global Conference on Climate Change Adaptation for Fisheries and Aquaculture
<http://fishadapt.com/modules/conference/>

Engendering Security in Fisheries and Aquaculture, Symposium on Gender in Aquaculture & Fisheries
<https://genderaquafish.org/2016-gaf6-august-bangkok-thailand/gaf6-themes/>